REMARKS

Applicant has cancelled claims 2-5 and 7-12, and claims 1 and 6 are now pending in the application. Applicant has amended claims 1 and 6 to include the subject matter of dependent claims 3 and 8.

REJECTION UNDER 35 U.S.C. § 102

Claims 1, 3-6, 8-12 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Lin, (U.S. Pat. No. 5,071,520). This rejection is respectfully traversed.

Claims 1 and 6

At the outset, the Applicant submits that the above rejection of claims 1 and 6 has been rendered moot by the present amendments adding the subject matter of dependent claims 3 and 8. The amendment clarifies that the peel strength enhancement coating includes a metal selected from the group consisting on chromate, tungstate and molybdate.

In the rejection of claims 1 and 6, the Examiner states on pg. 2 of the Final Office Action that Lin discloses an anti-tarnish coating comprised of Chromium and Chromium oxide (Lin, Col. 3, lines 63-65, Col. 4, lines 13-15 and 25-27). The Examiner further takes the position that Lin's anti-tarnish coating resembles the claimed peel strength enhancement coating.

However, the claimed peel strength enhancement coating is distinguished from and structurally different from Lin's anti-tarnish coatings. Lin discloses various solutions for providing an anti-tarnish treatment, including an aqueous chromic acid-phosphoric acid solution, an aqueous chromic acid-sulfuric acid solution, and electrolytically

depositing chromium and zinc ions on the foil by immersion in an electrolyte solution consisting of a hydroxide solution such as a hexavalent chromium compound. Hexavalent chromium compounds are those which contain the element chromium in the +6 oxidation state [Cr(VI)], which have octahedral coordination. (Advanced Inorganic Chemistry, 5th ed, Cotton/Wilkinson). The Applicant submits that Lin's disclosed aqueous chromic-phosphoric acid solution, aqueous chromic-sulfuric acid solution, and electrolytically deposited chromium ions only result in the deposition of chromium ions, and create coatings that are structurally different from that claimed by the Applicant.

Contrary to the teachings of Lin, claims 1 and 6 recite a metal selected from the group consisting of chromate, tungstate or molybdate (see ¶ 43 of present application). The present application states in ¶ [0042] that surface treatment 2 uses "an aqueous solution containing polyatomic anions that contain oxygen (oxyanions) formed from a metal selected from groups 5B, 6B, and 7B of the period table of the elements...the oxyanion containing the largest number of anions is most preferred (i.e., the "ate" ", where "Group 6B includes chromium, molybdenum, and tungsten". (see ¶ [0042]). An oxyanion is a polyatomic anion that contains oxygen, which can include a terminal metal element. In an aqueous solution, chromate and dichromate anions are in chemical equilibrium, depending on PH level:

$2\,CrO_4^{2-} + 2\,H_3O^+ \rightleftharpoons Cr_2O_7^{2-} + 3\,H_2O$ (Advanced Inorganic Chemistry, 5th ed, Cotton).

The Applicant notes that polyatomic anions containing oxyanions formed from a metal such as chromate is structurally different from the chromic acids in solution with phosphoric acid, sulfuric acid, or others disclosed in Lin. Lin's reference to a hexavalent chromium compound only refers to the ionic structure of the chromium, and none of the

chromic acid solutions disclosed in Lin teach the structure of oxygen and chromium together in oxyanions formed from a metal such as chromate. The applicant submits that this structural difference in solution results in the application of a coating unlike Lin, formed from the structurally different polyatomic anion form of chromate. The Applicant submits that the claimed coating formed from a solution structurally different from Lin cannot resemble the anti-tarnish treatment in Lin, in further view of the difference in the claimed copper foil's properties and characteristics, as pointed out below.

As the Office Action states, Lin discloses an anti-tarnish treatment that comprises deposition of chromium and zinc ions, (Col. 4, lines 13-15), which treatment the present application refers to in ¶ [0009] as a P2 treatement forming a tarnish resistance "coating that contains co-deposited ions of zinc and chromium". The present application further notes that with "(surface treatment 2) testing has shown that this treatment results in a reduction in both the percent edge undercut and the percent peel strength loss...when compared to prior art anti-tarnish coatings", such as the comparative sample 2 in Table 1 and comparative sample 7 in Table 2 which have a P2 anti-tarnish coating with chromium and zinc ions as disclosed in Lin. (see present application ¶ [0060], Table 1 and Table 2). Applicant notes that "each of the samples in Table 2 was prepared using smooth 5μm copper foil". (See present application ¶ [0065]).

Relative to comparative samples of copper foil treated with the containing a P2 anti-tarnish coating with chromium and zinc ions as disclosed in Lin, copper foils treated with chromate as in exemplary sample 5 and exemplary sample 10 possessed greater peel strength properties than the comparative samples treated with chromium ions. (See Table 1 and Table 2 of the present application). The present application states in

¶ [0043] that "in a preferred composition, the electrolytic solution contains chromate, tungstate, or molybdate. The Applicant submits that the claimed coating formed from a solution containing a polyatomic anion form of chromate that is structurally different from the solutions in Lin cannot resemble the anti-tarnish coatings in Lin, since they do not possess the same properties or characteristics. The Federal Circuit has held that where the claimed and prior art products are alleged to have identical compositions, the prima facie case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed product. *MPEP 2112*; *In re Best*, 195 USPQ at 433 (Fed. Cir. 1990). Here, testing disclosed in the present application has shown that smooth cooper foil having the anti-tarnish treatment disclosed in Lin does not necessarily possess the characteristics of enhanced peel strength provided by the claimed enhanced peel strength coating (surface coating 2) of the present application, as pointed out below.

The present application discloses testing that shows the unexpected results for a smooth copper foil having the claimed coating that achieves the same bond or peel strength of the roughened copper foil with anti-tarnish treatment, as disclosed in Lin. The Applicant submits that the claimed coating cannot resemble that disclosed in Lin, based on the present application's disclosure of "Comparative Sample 2 manufactured using a smooth copper foil subjected to the P2 treatment" for deposition of chromium and zinc ions as taught in Lin. This comparative sample 2 made with a smooth copper foil having a treatment as taught in Lin resulted in a peel strength of only 1.6 lbs/inch, where the smooth copper foil having the claimed coating resulted in a peel strength of about 5.5 lbs/inch.

Moreover, claims 1 and 6 recite a smooth copper foil that is structurally different from the wrought copper foil disclosed in Lin. Lin teaches that "To maximize adhesion, it is desirable to roughen the surface of the foil which contacts the dielectric prior to bonding", where "one exemplary technique involves the formation of dendrites on the copper foil surface". (See Lin, Col. 1 lines 34-39). Lin further states that the copper foil "provided with a plurality of dendrites is also plated with a zinc coating to increase the peel strength" and that "it is necessary that the foil be subjected to an anti-tarnish treatment". (See Lin, Col. 2, lines 42-46). Thus, Lin teaches towards anti-tarnish treatment of a roughened copper foil surface, and away from smooth copper foil, for the purpose of achieving greater peel strength. The Applicant submits that a person of ordinary skill in the art considering Lin would not have found it obvious to try coating a smooth cooper foil, with the solution having polyatomic anions containing oxyanions forming a chromate, for the purpose of achieving greater peel strength properties. Rather, Lin teaches a path that is divergent from that taken by the Applicant, and relies on roughened copper foil with anti-tarnish treatment of deposition of chromium ions. The Applicant submits that the claimed enhanced peel strength copper foil having a smooth surface with an Rz less than about 1μm is structurally different from Lin's increased peel strength copper foil that has been roughened, which Lin teaches is necessary to achieve increased peel strength. As such, the copper foil disclosed in Lin cannot resemble the claimed smooth copper foil, and cannot render obvious the claimed smooth copper foil in view of the unexpected result of different properties and characteristics previously disclosed.

While the Final Office Action notes that the present application discloses treatments that may be used for any copper foil, claims 1 and 6 claim a smooth copper foil, which the present application states the enhanced peel strength coating is particularly useful for. (see ¶ [0025] of the present application). While the treatment may be applied on any copper foil, the Applicant has claimed a copper foil having an enhanced peel strength coating that is particularly useful with the claimed smooth copper foil, which is critical to electrical performance requirements of the copper foil for high frequency applications where roughened copper foil is restricted. (see ¶ [0025] of the present application). Thus, the claimed enhanced peel strength coating and smooth copper foil would not have been obvious to a person of ordinary skill in the art seeking to improve peel strength, in view of Lin's teaching to use roughened copper foil. As such, the Applicant submits that claims 1 and 6 are not obvious in view of Lin, but rather are distinguished over Lin and allowable for at least the above reasons.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (314) 726-7500.

Respectfully submitted,

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